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METHODS OF DETERMINING SEA SALT AEROSOL PRODUCTION FLUX AND THEIR APPLICABILITY TO DIFFERENT SIZE CLASSES

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ABSTRACT

The interfacial sea salt aerosol (SSA) production flux is the number of particles per logarithmic size interval produced at the sea surface per unit area and time. The effective SSA production flux is number of particles per logarithmic size interval, per unit area and time, produced at the sea surface that attain a height of 10 m, it being assumed that once a particle attains this height it remains in the atmosphere for some appreciable time and can play a role in atmospheric chemistry, light scattering, and other atmospheric processes. Particle sizes are specified here by equilibrium radius at 80% relative humidity, r_{80}. Nine different methods of determining the sea salt aerosol (SSA) production flux over the ocean are identified. Some of these methods apply to the interfacial SSA production flux, others to the effective production flux. Different methods are applicable to different size ranges of SSA particles, denoted here as small SSA particles (0.1 μm $< r_{80}$), medium SSA particles (1 μm $< r_{80} <$ 25 μm), and large SSA particles (25 μm $< r_{80}$). For small SSA particles, the interfacial production flux and the effective production flux are nearly equal. For medium SSA particles, the ratio of the effective production flux to the interfacial production flux is less than unity and decreases with increasing r_{80}. For large SSA particles the effective production flux is essentially zero, as few of these particles remain in the atmosphere because of their large mass, coupled with the time it takes them to equilibrate to the local relative humidity. These nine methods and the estimates obtained using them are compared to arrive at best estimates for the interfacial and effective SSA production fluxes and their associated uncertainties.
